

Technical Report TR-67-49

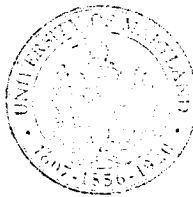
July 1967

FORMAT
A Text Processing Program

by

Gerald M. Berns

IBM Washington Scientific Center
in cooperation with the
Computer Science Center



UNIVERSITY OF MARYLAND
COMPUTER SCIENCE CENTER

COLLEGE PARK, MARYLAND

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| FACILITY FORM 602 | N 67-37083 | |
| | (ACCESSION NUMBER) | (THRU) |
| | 31 | |
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FORMAT --- A Text Processing Program

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The author wishes to express his gratitude to the computer centers of the University of Maryland and George Washington University for their generous cooperation, and to Bruce A. Russell and Samuel A. Wax for their fine assistance in the completion of this project.

I. Abstract of the Program:

FORMAT accepts free-form card-image text from any input device supported by OS/360 and produces on any OS/360 supported output device a document in upper and lower case (as desired) which is formatted according to user instructions. These instructions are in the form of control cards and Command Words which may be interspersed throughout the text input. The user may format his document from among the following options, which are communicated to FORMAT via free-form control cards:

- Number of text columns per page
- Width in print positions of text columns
- Number of lines per page
- Number of print positions between text columns
- Page numbering and first page number (or no page numbering)
- Number of print positions for paragraph indentation
- Line spacing (single spacing, double spacing, etc.)
- Minimum number of blanks between words
- Number of blank lines between paragraphs
- Right-justification of text or not
- Tab settings
- Limits of card field from which input is to be read
- Printing of title on every page or not
- Position of the title
- Position of the text
- Whether the page number, if any, is to appear only on the right of the page, only on the left, or to alternate right and left
- Automatic capitalization of sentences following periods, exclamation points, and question marks
- Kind of keypunch used
- Upper and lower case output (as specified) or upper case only

Command Operands in Command Words provide the capability to start a new line, paragraph, column, or page, to tabulate, to underline (and to stop), to read groups of control cards, to center text on a column-line (and to stop), to print text from cards "as is" (and to stop), to print text in upper case (and to stop), and to print text with each word capitalized (and to stop).

The normal output mode is lower case. Means are provided to the user which enable him to specify upper case and special characters.

II. Design Philosophies and Goals:

The philosophy of the design of FORMAT has been to provide an easy to use means of producing a computer-formatted document utilizing an upper and lower case and special character print train (particularly the "TN" train) on the IBM 1403 Printer, without prohibiting the use of any character. The program has been designed to be used as much like a typewriter as possible, in the belief that this would make it simpler to use for most people.

Major goals of the design of the program have been to produce a document regardless of user errors and to provide means of bringing these errors to the user's attention, so that as many errors as possible may be found per computer run.

Another goal has been to make listings of text input decks look as much like ordinary English as possible; i.e., to keep the use of special control characters to an absolute minimum. The program has also been designed to make editing of text decks (on cards) relatively easy to accomplish.

The program has been designed to use input from any kind of IBM keypunch with about equal ease, although the IBM 029 Key punch is slightly favored.

Another design goal has been to avoid the use of intermediate devices (for "scratch" files) and to operate on memory resident data only.

It will be noticed that the rules for titles differ somewhat from the rules for the body of the document. This has been intentional, the motivation being that the differences would be less important than the additional flexibility brought to title layout.

III. Control Cards:

Every FORMAT job must begin with a control card group, which is defined as a group of control cards ending with the "GO" control card (all other control cards are optional). The position of a control card within a control card group is not significant, unless specified in its description. A control card group may be read at any point in the program - see the "V" Control Operand in Section IV. Default values for each option are assumed if no control card pertaining to that particular option has been supplied in any control card group in the job.

The format of each control card is entirely free-form, within the following constraints:

1. Each control card must be wholly contained on one full card.
2. The first three non-blank characters of each control card must be as specified in the suggested control card name.
3. A zero or blank operand field must be separated from the next operand field by a comma, if the next operand field is non-zero and non-blank.

The control card names used here are only suggested names; any user name for a control card is acceptable providing the above rules are adhered to. Examples of correct and faulty control cards are given at the end of this section.

The effect of each control card is given below; related control cards are given in parentheses.

BETWEEN COLUMNS LEAVE xx BLANKS

The number of print positions to separate text columns is xx. The default number is 6.

CAPITALIZE AUTOMATICALLY

The first sentence of the document and each letter which follows a period and blank(s), question mark and blank(s), or exclamation point and blank(s) is capitalized automatically. The default action is that this option is not used. (See the "NO CAPITALIZATION AUTOMATICALLY" control card.)

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CARD IMAGE FIELD IS xx THRU yy
or
CARD IMAGE FIELD EXTENDS THRU yy

The first card column of the card field is xx, and the last card column of the card field is yy. If the second form of the control card is used, the card field extends from card column 1 through card column yy. All input to FORMAT, including titles but not control cards (which are unrestricted), is read from the field specified. The field must be at least 3 columns long. The default card field is columns 1 through 80.

CENTER TEXT STARTING ON LINE xx

The first line of the text is xx, and the body of the document is centered within the number of print positions allotted to the document (the full printer width if a single document is being produced, and half that if the "SIDE BY SIDE COPIES" control card is used). The position of the title (if any) is not affected by this control card. If there is a conflict between the specified first text line and the title, the text begins on the line following the title. The default first text line is 5, and the default first print position is 10. (See "START TEXT ON" and "TITLE STARTS ON" control cards.)

COLUMNS PER PAGE ARE xx

The number of text columns per document page is xx. The maximum allowable number of text columns per page is eight. The default number is 1.

CYCLE THE PAGE NUMBER STARTING AT xx

The page number, starting at xx (if non-zero and non-blank), is alternated in placement on successive document pages, first appearing on the upper right and then on the upper left. In each case the page number appears on line 1 aligned with the appropriate edge of the document body. If xx is zero or blank, page numbering is suppressed. The default action is that the page number, starting at 1, is aligned with the right edge of the text body. (See "LEFT PAGE NUMBER", "RIGHT PAGE NUMBER", and "PAGE NUMBER" control cards.)

GO

This control card is the only one required; it signals the end of a control card group. After reading this control card the program starts (or resumes) processing text.

JUSTIFICATION

Text in the document body is right-justified within column-lines. Right-justification is accomplished by the introduction of $a-b-c*(d-1)$ blanks (where a = the column width in print positions, b = the number of non-blank characters on the line, c = the greatest number of blanks which can delimit each word on the line [$c \geq$ the operand on the "WORD SEPARATION" control card or, if not used, its default], and d = the number of words on the line), one to each word delimiter, working alternately from the right end of the line leftward and the left end of the line rightward on successive lines. The number of blanks between input text words is ignored. FORMAT does no hyphenation. The default action is right-justification. (See the "NO JUSTIFICATION" control card.)

LEFT PAGE NUMBER STARTING AT xx

The page number, starting at xx (if non-zero and non-blank), is placed on line 1 aligned with the left edge of the left-most text column. If xx is zero or blank, page numbering is suppressed. The default action is that the page number, starting at 1, is aligned with the right side of the text body. (See "CYCLE PAGE NUMBER", "PAGE NUMBER", and "RIGHT PAGE NUMBER" control cards.)

LINES PER PAGE ARE xx

The maximum number of lines of all kinds (including text lines, paragraph separation lines, title lines, etc.) which are allowed on a document page is xx . The default number is 59, which is also the maximum allowable number of lines per page.

NO CAPITALIZATION AUTOMATICALLY

No capitals are automatically produced. This is also the default action. (See the "CAPITALIZE AUTOMATICALLY" control card.)

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NO JUSTIFICATION

The text is not right-justified. The number of blanks between input text words is ignored. The default action is right-justification of text.

PAGE NUMBER STARTING AT xx

The page number starts at xx (if non-blank and non-zero) and is placed on line 1 of each document page. If xx is zero or blank, page numbering is suppressed. The default page number is 1. (See "CYCLE PAGE NUMBER", "LEFT PAGE NUMBER", and "RIGHT PAGE NUMBER" control cards.)

PARAGRAPH INDENT IS xx

The number of print positions to be skipped at the start of a paragraph is xx. The default indentation is 5 print positions.

REPEAT TITLE ON EVERY PAGE

The title (if any) is printed on every page of the document. The default action limits the appearance of the title (if any) to the next page produced. (See the "STOP PRINTING TITLE" control card.)

RIGHT PAGE NUMBER STARTING AT xx

The page number, starting at xx (if non-zero and non-blank), is placed on line 1 aligned with the right edge of the right-most text column. If xx is zero or blank, page numbering is suppressed. The default action is the same as the action of this control card, and the default page number is 1. (See "CYCLE PAGE NUMBER", "LEFT PAGE NUMBER", and "PAGE NUMBER" control cards.)

SEPARATION LINES BETWEEN PARAGRAPHS ARE xx

The number of blank lines to separate paragraphs is xx. The default number is 1.

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SIDE BY SIDE COPIES

Two copies of the document are written simultaneously, side by side, provided that the number of print positions across all text columns of the document is 66 or less. The default action is to print one copy.

SPACING OF TEXT LINES IS xx

The spacing for the document is xx (e.g., xx = 1 means single spacing, xx = 2 means double spacing, etc.). The default assumption is single spacing.

SPECIAL KEYPUNCH

This control card specifies that the text input originated on an upper and lower case keypunch, or on any device which produces the specific card code for each character desired. Lower case letters are not forced by the program, and the Special Operand "Z" does not produce superscripts. The default action is the normal FORMAT action.

SPECIAL PRINTER TRAIN

The ultimate printer of the document cannot print lower case or superscript characters. Therefore, when this control card is in effect, no translation to lower case or superscripts is made. The default action is that the translation is made.

START TEXT ON LINE xx IN PRINT POSITION yy

The first line of the text is xx, and the first print position is yy. If there is a conflict between the specified first text line and the title, the text begins on the line following the title. If no text positioning information is supplied, the text is started on line 5 and in print position 10. (See "CENTER TEXT" and "TITLE STARTS ON" control cards.)

STOP PRINTING TITLE ON EVERY PAGE

The title (if any) is printed on the next page produced only. The default action is the same as the action of this control card. (See the "REPEAT TITLE" control card.)

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TABS ARE SET AT xx1,xx2,...,xx13

The operand fields of this control card specify the tab positions of up to 13 tabs. These are given in relative character positions within the text column-line (e.g., a tab set at 10 means that the tab field begins in character position 10 in each column-line; the first word following a tab from a position in the column-line before 10 starts in character position 10). Tabs must be set in ascending order, and no tab may be set at a position greater than the column width. The action of this control card is analogous to the action of the tab set key on a typewriter. The default action is that no tabs are set.

TITLE STARTS ON LINE xx IN PRINT POSITION yy

The first line of the title is xx, and the first print position of the title is yy. This control card, if used, must be followed immediately by the card(s) containing the title (see Section VI B) and the "GO" control card. The title must be positioned above the body of the document. The default values for xx and yy are 2 and 10 respectively.

WIDTH OF COLUMNS IS xx PRINT POSITIONS

The width in print positions of each text column is xx (all text columns are the same width). The default width is 80 print positions.

WORD SEPARATION OF xx BLANKS

The number of blank characters between untabbed words on the document will never be fewer than xx (if not in the "as is" mode; see Section IV). The default number is 1.

026 KEYPUNCH

This control card specifies that the Command Words used in the input have been punched on an IBM 026 Keypunch, or any keypunching device which punches 12-8-4 for the character used to begin Command Words (nominally ")"). The default action assumes the IBM 029 configuration for the ")", which is 11-8-5.

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029 KEYPUNCH

This control card specifies that the Command Words used in the input have been punched on an IBM 029 Keypunch, or any keypunching device which punches 11-8-5 for the character used to begin Command Words (nominally ")"). The default action is the same as the action produced by this control card.

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Examples of Correct Control Cards:

[1]Card Columns.[80]

TAB SET 5 10 15 20

TABS ARE SET AT PRINT POSITIONS 5, 10, 15 AND 20

TABULATE TO 5 10 15 20

TAB5 10*

15

20

START THE TEXT ON LINE 10, PRINT POSITION 20

START THE TEXT ON LINE 10, PRINT POSITION 20

START DOCUMENT: LINE = 10, P. POSITION = 20

START TEXT 10 20

START TEXT ON THE DEFAULT LINE, PRINT POSITION 5

START TEXT 0 , 5

START TEXT: ,5

LEFT CORNER FOR PAGE NUMBERS STARTING AT PAGE NO. 2

LEF2

TITLE

TITLE STARTS ON LINE 2 IN PRINT POSITION 10

Examples of Faulty Control Cards:

GO NOW

BEGIN TEXT

(An unrecognizable control card is treated as a "GO" card)

START TEXT 0 5

(Text starts on line 5 in the default print position)

TABS = 1 2 3 4 5 6 7 8 9 10 11 12 13 14

(The 14th tab set is ignored)

LINES/PAGE = 5 7

(The number of lines per page will be 5, not 57)

COLUMNS/PAGE = TWO

(The number of columns/page will be the default value)

IV. Command Operands and Command Words:

A Command Operand is an imperative instruction to FORMAT to perform an immediate action. Command Operands can be interspersed as desired by the user throughout his text input in the form of Command Words. A Command Word is a string of one or more Command Operands in the order of desired execution prefixed by the character ")". (See "026 KEYPUNCH" and "029 KEYPUNCH" control cards in Section III.) some Command Operands may also be used in titles. The Command Operands available in FORMAT are described below in alphabetical order:

A -- Cease reading input from the present card, and begin printing cards in the "as is" mode starting with the next card, continuing to do so with successive cards until the character ")" is encountered in the first position of the defined card field (see the "CARD IMAGE FIELD" control card, Section III). The only Command Operands which have effect while in the "as is" mode are "ø" and "F". Both the Special Operands (see Section V) have effect in the "as is" mode. In this mode each card is printed on one column-line without change to the spacing of material on the card, except that the Command Words and Special Operands used take no print positions. If the contents of a card exceed the length of the column-line, the contents of the card beyond the end of the line are lost. "A" may not be used in titles.

C -- Begin the next text column. In a single column document, this is equivalent to the Command Operand "S". "C" may not be used in titles.

E -- End the job, or end the title. As many jobs as desired may be stacked one behind the other.

F -- Begin capitalizing each word, and continue doing so until another "F" Command Operand is encountered. "F" may be used in titles. See the "V" Command Operand description.

L -- Start the next column-line. The action of this Command Operand is similar to the action produced by striking the "return" button on an electric typewriter. "L" may be used in titles. If "L" is used in a title the next sequential line is

begun; if "L" is used in the body of the document the next column-line is begun, leaving "SPACING" - 1 blank lines between. If the Command Operand "L" is used to skip lines at the top of a text column, it is ignored.

M -- Begin centering text within its column-line, and continue doing so for successive lines until another "M" Command Operand is encountered. "M" may not be used in titles.

P -- Begin a new paragraph, leaving the number of lines specified on the "SEPARATION LINES" control card between paragraphs and indenting the number of print positions specified on the "PARAGRAPH INDENT" control card. "P" may not be used in titles.

S -- Begin a new page. "S" may not be used in titles.

T -- Tab to the next set tab position beyond the present position in the column-line. "T" may not be used in titles. The action of the Command Operand "T" corresponds to the action produced by striking the tabulate key on a typewriter. Right-justification, if in effect when "T" is used, is suspended for the column-line on which the tab occurs.

U -- Begin underlining, and continue to do so until another "U" Command Operand is encountered. "U" may not be used in titles. Individual characters within a word cannot be underlined. (Underlining is not implemented in the first release of FORMAT.)

V -- Read in the next group of control cards. A control card group must immediately follow the card containing the "V" Command Operand. All characters following the Command Operand "V" on the same card are ignored. The action produced by "V" stops the action initiated by the Command Operands "F" and "Z", and depresses the "CAPITALIZE AUTOMATICALLY" feature (if in effect) until the end of the next sentence. "V" may not be used in titles.

Z -- Begin printing all letters in upper case, and continue to do so until another "Z" Command Operand is encountered. The action of "Z" is equivalent to locking a typewriter keyboard in

upper case, and then unlocking it. "ø" may be used in titles. The "ø" Command Operand does not cause numbers to be printed as superscripts. See the "v" Command Operand description.

Some Examples of Command Words:

1. MEN ARE SLOW)L TO GRASP NEW IDEAS;

"to grasp..." begins a new column-line.

2.)LTTTUø now)Uø is the time.

A new line is begun, and beginning at the third tab position is printed: "NOW is the time".

3. Note that)CP does not produce the same effect as)PC, which is effectively the same as)C.

4.)M *)L ***)L *****)L *****)L *****)L ***)L *)M

This produces:

```

      *
     ***
    *****
   *****
  *****
 ***
 *
```

FORMAT can produce upper and lower case and special character output in two different manners. If the text input is punched with the Hollerith codes representing the characters desired (such as are produced by an upper and lower case keypunch, for example) the proper character representation on output is supplied directly by the hardware of the computer system. If, however, no such upper and lower case keypunch is used or approximated by multi-punching on a standard keypunch, then programming conventions must be used to accomplish the objective of upper and lower case and special character output.

The Use of the "ø" Special Operand:

A letter preceded immediately by "ø" is printed in upper case, a number so preceded is printed in superscript form, and any other symbol so preceded is printed preceded by the graphic "ø". If one or both "SPECIAL" control cards is in effect the translation of a number to a superscript is not made. The "ø" character must be multi-punched on an IBM 026 type keypunch; its Holerith code is 12-8-2.

A special character is defined as one which is neither a letter nor a number (normal or superscript) nor one of the following: * \$ % ' - , / . A special character is produced whenever the string of characters "!nn" is read, where nn is any number from 10 to 51 (if nn is not in the range from 10 to 51 then "!an" will be printed). The correspondence between nn and the special characters which can be produced by the TN print train for the IBM 1403 Printer are as follows:

() + - { } [] ≤ ≥ ± ≠ √ ∩ ∪ ⊂ ⊆ ⊇ ⊈ ⊉ ⊊ ⊋ ⊌ ⊍ ⊎ ⊏ ⊐ ⊑ ⊒ ⊓ ⊔ ⊕ ⊖ ⊗ ⊘ ⊙ ⊚ ⊛ ⊜ ⊝ ⊞ ⊡ ⊢ ⊣ ⊤ ⊥ ⊦ ⊧ ⊨ ⊩ ⊪ ⊫ ⊬ ⊭ ⊮ ⊯ ⊰ ⊱ ⊲ ⊳ ⊴ ⊵ ⊶ ⊷ ⊸ ⊹ ⊺ ⊻ ⊼ ⊽ ⊾ ⊿ ⊺ ⊻ ⊼ ⊽ ⊾ ⊿

It should be noted that the special characters from nn = 32 through nn = 51 can be punched directly on the standard IBM 029 Keypunch, that the "!" character itself (11-8-2) must be multi-punched on an IBM 026 type keypunch, and that !43 and !51 are not equivalent to the Special Operands "z" and "!" respectively.

Examples of the Usage of the Special Operands ("SPECIAL KEYPUNCH" and "SPECIAL PRINT TRAIN" not in effect):

1. $\emptyset 1$ produces: 1
2. $\emptyset P \emptyset I * R \emptyset 2$ produces: $PI * r^2$
3. $) \emptyset PI * R 2) \emptyset$ produces: $PI * R 2$
4. $) \emptyset PI * R \emptyset 2) \emptyset$ produces: $PI * R^2$
5. $) F TEXT 1 \dots TEXT N) F$ produces: Text1 ... Textn
6. $) F TEXT \emptyset 1 \dots T \emptyset EXT N) F$ produces: Text¹ ..., TExtⁿ
7. $D \emptyset Y \emptyset 2 / D \emptyset 2 \emptyset X$ produces: dY^2 / d^2X
8. $\emptyset E ! 10 \emptyset 2 ! 12 \emptyset 3 ! 11$ produces: $E(2+3)$
9. 6! Produces: 6!
10. 6!51 produces: 6!
11. $\emptyset I WISH \emptyset I HAD 53 \emptyset !$ Produces: I wish I had 53 $\emptyset !$
12. $\emptyset ONCE \emptyset I HAD 25 ! 43 ! 48 \emptyset NOW IT ! 42 S GONE.$
 produces: Once I had 25 \emptyset ; Now it's gone.
13. !52 produces: !52
14. !6 produces: !6

VI. Rules for Using FORMAT:

A. General:

1. Each FORMAT job must begin with a control card group (the minimum control card group consists of the "GO" control card).
2. Titles and text input must appear in the field specified on the "CARD IMAGE FIELD" control card, or, if not used, in the default card field (card columns 1 through 80).
3. A FORMAT job is ended by the appearance of the "E" Command Operand. Multiple FORMAT jobs may be stacked one behind the other.

B. Titles:

1. The card(s) containing the title must immediately follow the "TITLE STARTS ON" control card.
2. The "L", "F", "Z", and "E" Command Operands may be used in titles. If a title word begins with ")" and contains any other operand, the ")" and foreign character(s) will print.
3. A title is ended by the Command Operand "E".
4. Each title line begins in the print position specified on the "TITLE STARTS ON" control card (or its default) and ends when a Command Word containing either the "L" or "E" Command Operand is encountered, or else when the title line attempts to exceed the last printer position allowed to the document (the full printer width if a single document is being written, and half that if the "SIDE BY SIDE" control card is in effect).
5. All blanks and hyphens appearing on title cards are printed.
6. No right-justification is accorded to titles, since no right-most title limit is defined.
7. The "L" Command Operand always acts as if single spacing were in effect, regardless of the operand field on the "SPACING OF TEXT LINES" control card, if used. The "E" Command Operand, in addition to ending the title, also single spaces. Thus:

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TITLE LINE 1)LL TITLE LINE 2

results in one blank line between title lines, while

LAST TITLE LINE)LLE

results in a minimum of two blank lines separating the last title line from the body of the document.

8. The Special Operands "¢" and "!" may be used in titles.

C. Body of the Document:

1. Command Words containing any Command Operand may appear freely interspersed throughout the text. Some users may want to keep Command Words on separate cards from the text for easy format changing; this is perfectly acceptable. Illegal operands are diagnosed and ignored, except that they terminate the column-line on which they appear. Therefore, no text word may begin with a ")" character (nor the appropriate "!nn" configuration for ")").

2. Input blanks between words serve only as word delimiters (unless operating in the "as is" mode). FORMAT inserts between words the number of blanks specified on the "WORD SEPARATION" control card (or its default), plus blanks as required to accomplish right-justification, if in effect (see the "JUSTIFICATION" control card for details).

3. Hyphens are not introduced by FORMAT. Hyphens input to FORMAT will print; such a hyphen may be selected by FORMAT to be the last character on a column-line.

VII. Summary of FORMAT User Information:

The control cards are shown here grouped together by the options to which they refer. Thus, the "JUSTIFICATION" and "NO JUSTIFICATION" control cards are grouped because each refers to the right-justification option. Within each group one control card is assumed by FORMAT if no control card from that group is used, unless it is specifically stated (in the case of a one control card option group) that it is not assumed. The operand value(s) for the assumed control card are also shown.

| Control Cards | If Omitted |
|--|-------------------------|
| BETWEEN COLUMNS LEAVE xx BLANKS | xx=6 |
| CAPITALIZE AUTOMATICALLY | |
| NO CAPITALIZATION AUTOMATICALLY | assumed |
| CARD IMAGE FIELD IS xx THRU yy | |
| CARD IMAGE FIELD EXTENDS THRU yy | xx=1, yy=80 |
| CENTER TEXT STARTING ON LINE xx | |
| START TEXT ON LINE xx IN PRINT POSITION yy | xx=5, yy=10, assumed |
| COLUMNS PER PAGE ARE xx | xx=1 |
| CYCLE THE PAGE NUMBER STARTING AT xx | |
| LEFT PAGE NUMBER STARTING AT xx | |
| PAGE NUMBER STARTING AT xx | |
| RIGHT PAGE NUMBER STARTING AT xx | xx=1, assumed |
| GO | error |
| JUSTIFICATION | |
| NO JUSTIFICATION | assumed |
| LINES PER PAGE ARE xx | xx=59 |
| PARAGRAPH INDENT IS xx PRINT POSITIONS | xx=5 |
| REPEAT TITLE ON EVERY PAGE | |
| STOP PRINTING TITLE | assumed |
| SEPARATION LINES BETWEEN PARAGRAPHS ARE xx | xx=1 |

Command Operands [Format of Command Words is ")X...Y "]

! Special Operand Values [Format is "!nn"]

() + - { } . [] ≤ ≥ ≠ ≡ ⊂ ⊃ ⊆ ⊇ ⊈ ⊉ ⊊ ⊋ ⊌ ⊍ ⊎ ⊏ ⊐ ⊑ ⊒ ⊓ ⊔ ⊕ ⊖ ⊗ ⊘ ⊙ ⊚ ⊛ ⊜ ⊝ ⊞ ⊠ ⊡ ⊢ ⊣ ⊤ ⊥ ⊦ ⊧ ⊨ ⊩ ⊪ ⊫ ⊬ ⊭ ⊮ ⊯ ⊰ ⊱ ⊲ ⊳ ⊴ ⊵ ⊶ ⊷ ⊸ ⊹ ⊺ ⊻ ⊼ ⊽ ⊾ ⊿ ⊺ ⊻ ⊼ ⊽ ⊾ ⊿

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The keypunch code for "z" is: 12-8-2
The keypunch code for "!" is: 11-8-2

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VIII. An Example of Input to FORMAT:

Section VII of this manual was produced from input like the following:

```
CARD IMAGE FIELD = 2 THRU 64
CAPITALIZE AUTOMATICALLY
LINES/PAGE = 56
WIDTH OF COLUMNS = 64
CENTER TEXT ON LINE 9
TABS ARE AT 10 AND 50
TITLE STARTS ON LINE 2, PRINT POSITION 49
)Z FORMAT )ZF --- A TEXT PROCESSING PROGRAM )FE
GO
```

```
.
.
.
.
.
)Z VII. )ZU ZSUMMARY OF )Z FORMAT )Z ZUSER ZINFORMATION:
)ULLP
```

```
ZTHE CONTROL CARDS ARE SHOWN HERE GROUPED TOGETHER BY THE OPTIO
NS TO WHICH THEY REFER. THUS, THE )Z "JUSTIFICATION" )Z AND )Z
"NO JUSTIFICATION" )Z CONTROL CARDS ARE GROUPED BECAUSE EACH RE
PERS TO THE RIGHT-JUSTIFICATION OPTION. WITHIN EACH GROUP ONE C
ONTROL CARD IS ASSUMED BY )Z FORMAT )Z IF NO CONTROL CARD FROM
THAT GROUP IS USED, UNLESS IT IS SPECIFICALLY STATED (IN THE CA
SE OF A ONE CONTROL CARD OPTION GROUP) THAT IT IS NOT ASSUMED.
THE OPERAND VALUE(S) FOR THE ASSUMED CONTROL CARD ARE ALSO SHOW
N. )LLL
```

```
)T ZCONTROL ZCARDS )T ZIF ZOMITTED )LLZ
BETWEEN COLUMNS LEAVE )ZU XX )UZ BLANKS )ZT XX=6 )LL
)Z CAPITALIZE AUTOMATICALLY )L
NO CAPITALIZATION AUTOMATICALLY )TZ ASSUMED )LLZ
CARD IMAGE FIELD IS )UZ XX )UZ THRU )UZ YY )UT XX=1,YY=80 )LZ
```

```
.
.
.
.
.
WORD SEPARATION OF )ZU XX )UZ BLANKS )ZT XX=1 )ZLL
026 KEYPUNCH )L
029 KEYPUNCH )ZT ASSUMED )LLLL
)M ZCOMMAND ZOPERANDS !16ZFORMAT OF ZCOMMAND ZWORDS IS
" )ZX...ZY "!17 )MLLT
ZA -- PRINT "AS IS" )LT
ZC -- BEGIN NEW COLUMN )LT
```

```

      .
      .
      .
%V -- READ IN THE NEXT GROUP OF CONTROL CARDS )LT
% -- PRINT IN UPPER CASE ONLY, AND STOP )LLLL
)M ! %SPECIAL %OPERAND %VALUES !16%FORMAT IS "%!NN"!17 )LLL
N 111111111122222222223333333333444444444455 )L
N 012345678901234567890123456789012345678901 )LL
    !10!11!12!13!14!15 ... 149!50!51 )LLLL
%THE KEYPUNCH CODE FOR "%" IS: 12-8-2 )L
%THE KEYPUNCH CODE FOR "!" IS: 11-8-2 )MS

```

FORMAT --- A Text Processing Program

IX. System Requirements and OS/360 Control Cards:

The distributed version of FORMAT is written in Fortran IV and requires 9DF8 (=40,440) bytes of memory, including the requisite subroutines from the Fortran library of OS/360 Release 9.5. The program has operated successfully in a 64K System/360 with an OS/360 Resident Supervisor of 44D0 bytes.

FORMAT is comprised of the following five subprograms:

| name | size |
|-------|-------------|
| FMTIV | 588 (1416) |
| COND | 524 (1316) |
| ERR | F4 (244) |
| VRDR | E74 (3700) |
| DRDR | 1466 (5222) |

The subprograms VRDR and DRDR can overlay each other, but FORMAT has only been tested without overlays.

FORMAT reads its input from data set FT05F001, writes its output onto data set FT06F001, uses data set FT01F001 as intermediate storage for error diagnostics, and uses data set FT03F001 as intermediate storage for control cards.

A representative FORMAT run setup looks like the following:

```
//FMT JOB 105,BRIAN,MSGLEVEL=1
// EXEC FORTH LG
//SYSIN DD *
```

FORMAT object deck

```
/*
//GO.FT01F001 DD UNIT=2311,DISP=(,DELETE),SPACE=(CYL,(1,1)), *
// DCB=(,BFTEK=S,BUFNO=1,RECFM=F)
//GO.FT03F001 DD UNIT=2311,DISP=(,DELETE),SPACE=(CYL,(1,1)), *
// DCB=(,BFTEK=S,BUFNO=1,RECFM=F)
//GO.SYSIN DD *
```

FORMAT job(s)

```
/*
```

FORMAT --- A Text Processing Program

The procedure FORTHLG is described in C28-6602; the procedure FORTGLG described in C28-6639, or any equivalent procedure, may be used instead.

Please send notification of any error encountered using FORMAT, along with all pertinent material, to:

Gerald M. Berns
Washington Scientific Center
IBM
11141 Georgia Avenue
Wheaton, Maryland

FORMAT --- A Text Processing Program

X. Error Checking

One of the primary design goals of FORMAT has been to continue producing reasonable output regardless of user errors, so that the user may find his errors in as few machine runs as possible. Theoretically, it should be possible to introduce a random collection of readable cards to FORMAT and get a representative document out, along with specific error diagnostics.

Errors detected in the body of the text produce diagnostics which are printed at the end of each job. Each diagnostic contains an error-code, which refers to the kind of error detected and the action taken by FORMAT when it is encountered, the document page number being produced when the error occurred, the column number within the page, the line number within the column, and the number of the character within the line -- or else the control card group number if the error occurred on a control card.

XI. Error Messages:

212. An operand on the "TITLE STARTS ON" control card is not within the specified range. The previous values (or, if none, the default values of 2 and 10 respectively) are used instead.

214. An error has occurred on the "CARD IMAGE FIELD" control card. The previous field (or, if none, the default field of columns 1 through 80) is used instead.

218. An unrecognizable control card has been read. It is treated as if it were the "GO" control card.

219. The number of print positions required exceeds the number available (132 is standard). The document is forced to begin in the first print position, and the width of the text columns is redefined to be the largest value possible.

234. The operand on one of the following control cards is not within the specified range. The previous value (or, if none, the default value) is used instead. The control cards and their default values are:

COLUMNS PER PAGE IS (1)
 LINES PER PAGE ARE (59)
 PARAGRAPH INDENT IS (5)
 SEPARATION LINES BETWEEN PARAGRAPHS ARE (1)
 SPACING OF TEXT LINES IS (1)
 WIDTH OF COLUMNS IS (80) PRINT POSITIONS
 WORD SEPARATION OF (1) BLANK

237. The tabs have not been set in ascending order. Starting with the first tab set out of order, the tabs are set to the last position on the column-line.

267. A tab has been set to a position beyond the end of the column-line. The erroneously set tab and the tabs which follow it are set to the last position on the column-line.

269. The body of the document has been set to begin on a line below the bottom of the page. It is begun immediately following the title, but not above line 5.

327. The Command Operand "T" has occurred at a position in the column-line beyond the position of any tab set, or an unset tab has been used. The tab Command Operand is ignored.

417. A string of non-blank, unhyphenated characters is longer than the column-line. It is printed without hyphenation over as many lines as are required to contain it.

517. Too many separate underlines have been attempted on this column-line. The column-line is terminated and a new column-line is begun.

524. Underlining is not supported in this release of FORMAT. The Command Operand is ignored.

700. A Command Word contains an undefined Command Operand. It is ignored, and the column-line on which it occurs is terminated. The undefined Command Operand is in the position given if it is the first character of the column-line; or else it is in the preceding column-line.

ALSO:

IHC219I. This error code is issued by the IHCFIOSH Fortran library routine, assuming that the requisite correct DD statements are used, when the last FORMAT job is not ended by the Command Operand "E". The last portion of the text may be lost.